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Background and objective

Numerous Danish municipalities have implemented various legislations and projects at recycling centres for increasing the recycling rates of the following waste fractions: (1) paper, (2) board, (3) plastic, (4) metal, (5) wood, (6) textile, and (7) glass. While significant knowledge and experience were locally gained, lessons learnt have not been extensively exploited. One of the reasons is the absence of a consistent approach to assessing and documenting the effect of these initiatives.

The overall aim of this study is to provide a comprehensive procedure to waste management practitioners enabling them to analyse and document the impact of incentives on recycling rates.

Results

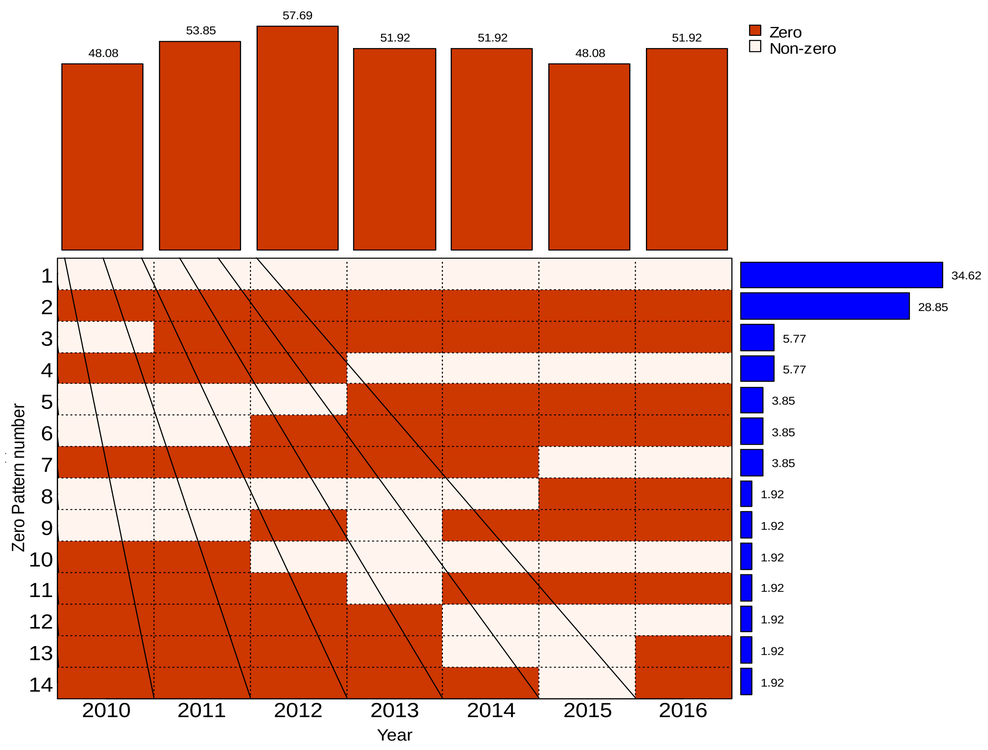


Figure 1: Patterns of zero and non-zero mass of individual waste fractions recorded at the recycling center in the suburb of Copenhagen in the period 2010-2016. vertical bars (in red) present the percentage frequency of zero values; Horizontal bar (in blue) show the percentage frequency of nonzero values for each of 14 zero patterns (see left side of the graph)

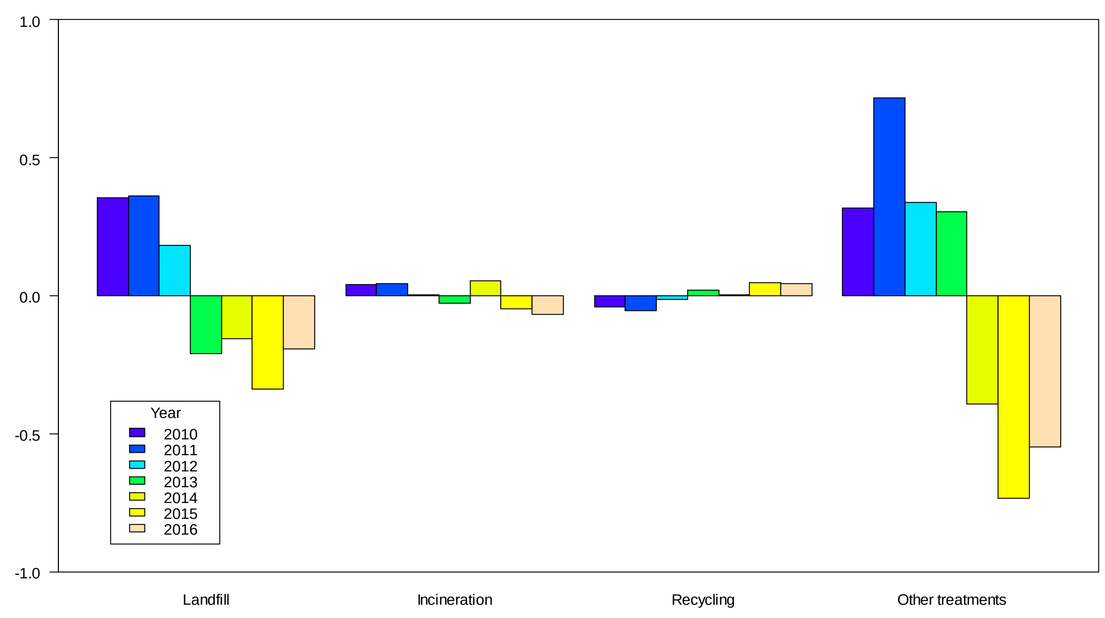


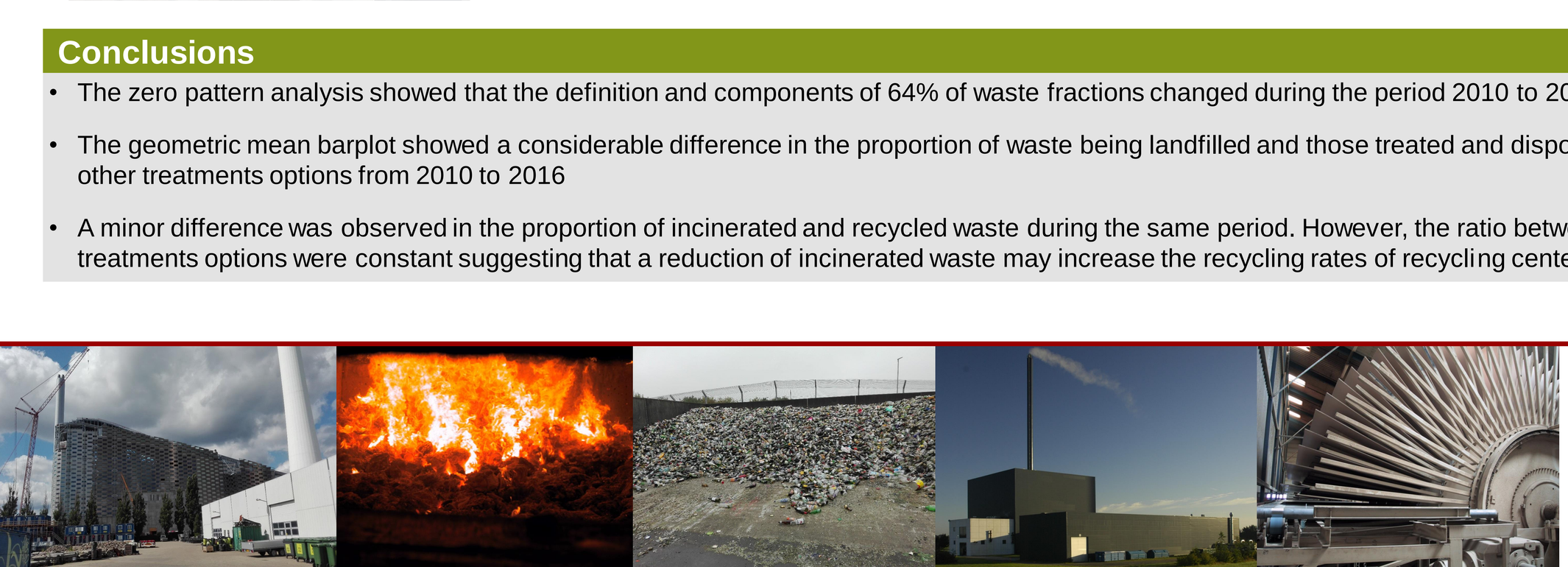
Figure 2: Geometric mean barplot showing the difference in the composition of waste treatment and disposal options over the period 2010-2016

Table 1: Variation array of the composition of waste fractions grouped per treatment options showing total variance in percentage (clr variance (%)), pairwise log-ratio (lower triangle) and pairwise log-ratio variances (upper triangle). Squared painted in blue and red shows lowest and highest variability, respectively.

			Variance ln(Xi/Xj)		
Xi\Xj	**Landfill**	**Incineration**	**Recycling**	**Other treatments**	**clr variances (%)**
Landfill		0.06	0.09	0.10	8
Incineration	1.62		0.00	0.23	13
Recycling	2.74	1.12		0.29	24
Other treatments	-1.41	-3.03	-4.15		55
	Mean ln(Xi/Xj)			**Totalvar %**	**100**

Conclusions

- The zero pattern analysis showed that the definition and components of 64% of waste fractions changed during the period 2010 to 2016
- The geometric mean barplot showed a considerable difference in the proportion of waste being landfilled and those treated and disposed of by means of other treatments options from 2010 to 2016
- A minor difference was observed in the proportion of incinerated and recycled waste during the same period. However, the ratio between these treatments options were constant suggesting that a reduction of incinerated waste may increase the recycling rates of recycling centers.



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